O B S E R V A T I O N S

O N

FIFTEEN CASES OF MALIGNANT PUSTULE.

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OBSERVATIONS ON FIFTEEN CASES

OF MALIGNANT PUSTULE

Malignant Pustule, not being a frequently observed disease, the fact of having seen fifteen cases during the last two years at the Nerthern Hospital Liverpool, warrants the selection of this highly interesting disease as the subject of my thesis.

I propose first of all to give a short introduction touching upon the nature of the disease and its source, then a full account of the cases bringing out as far as possible the salient features of each case and finishing with a summary and discussion from a prophylactic point of view.

The bacteriology is too well known for me to dwell on, excepting in so far as is necessary for the stating of my cases completely.

The disease known as Malignant Pustule is a disease of occupation. It is caused by the lodging of Bacillus Anthrax or its spores in some spot where the skin is broken such as a fresh cut or scratch or a scratched pimple; in fact anywhere where the skin is broken no matter from what cause.

It occurs most commonly on the uncovered parts of the body, the face, neck, and arm, by far the most frequent site being the neck.

Infection may also be brought about by rubbing or scratching a pimple with the hand or finger nails.

A case is recorded by Wilton Mill in which the poison entered by a small burn on the cheek.

(1) Reference.

Infection on uncovered parts of the skin surface is either brought about by rubbing or scratching the covered parts of skin with hands carrying the Bacillus or its spore or by the spore making its way through the clothes. If clothes are worn continuously without being cleaned, the dust makes its way through to the skin surface.

The first symptom of malignant pustule is a small raised inflamed area of the nature of a pimple or boil, often quite painless but very soon taking on evil ways; in a few days this pimple becomes black in the centre, surrounded by a ring of vesicles. The tissues in the immediate neighbourhood then become acutely inflamed, indurated, and oedematous. The lymphatics and glands related to the area are affected. After a time the toxic products of the Bacillus find their way into the system and give rise to grave constitutional disturbances; this may be followed by general infection with the bacillus, a condition always fatal.

The vesicles surrounding the necrosed area con-

tain serous fluid loaded with the Bacillus Anthrax. Inflammation rapidly extends around the black centre, oedema and general symptoms rapidly advance and if untreated the result in a very large proportion of cases is death.

As stated before, Malignant Pustule is a disease of occupation and it is amongst those handling hides, skins, fleeces, hair, bristles, and the like that it is most common.

It will be pointed out later that cases occur in which the patients have never handled any such articles, the infection being conveyed to them indirectly. The manner in which hides themselves become centre of infection is as follows :-

Anthrax or Splenic Fever is a disease affecting certain animals chiefly the herbivora, and amongst them cattle, horses, sheep and swine are most prone to the malady.

It is stated that the mortality among animals affected by Anthrax is from 70 to 80%.

The depradations of this disease are at times of a very serious nature. The geographical distribution is very wide. It occurs in Poland, Hungary, countries of the Lower Danube, Prussia, Saxony, and central departments of France. It is prevalent in Siberia ("Yama") and in the Western parts of Asia, in Lapland, in India (Indiana plague) in South Africa (? horse sickness), Australia, Mexico and South America. It occurs not only in domestic animals but also in deer,

reindeer, buffaloes and even elephants. (2)

The disease is endemic and epidemic. It is dependent upon the presence of the Anthrax Bacillus in the blood and organs of the animal affected. As a rule its onset and course is extremely rapid, in many cases a few hours sufficing to destroy life. There are less acute cases in which the animal is languid, loses its appetite, is markedly feverish and may ormay not develop swellings in different parts of the body.

But I believe that as a matter of fact very few cases are recognised in the life of the animal, the first indication of the character of the disease being the death of the animal infected.

The discharges and blood contain the Bacilli in very large numbers. Before death these discharges are a ready source of infection to other animals and after death the blood if spilt becomes also a ready source of infection. In many cases the body is opened for examination or possibly to remove the hide or even in order to make use of the flesh for consumption. During any of these processes the hide and the surroundings become smeared with the discharges and blood.

In many cases the carcase is dragged from one part of the field or shed to another part for burial, contaminating, unless very stringent precautions are adopted, everything it comes in contact with.

It is usually from the handling of such infected

hides and skins that man becomes inoculated, but flies, mosquitos and other insects have been known to carry the spores or Bacilli from an Anthrax poisoned body or fluid therefrom to the human being, the period of incubation being from a few hours to a few days.

Dr. G. A. Williamson (Cyprus) related a case of a woman being infected by the bite of an insect. (3) Veterinary surgeons and men who open the bodies of animals dead of Anthrax may become directly infected from the blood or the discharges.

Given a hide of an animal dead of Anthrax let us follow it from the start until it reaches the tannery to be eventually turned out as leather. We will take a dry hide as there are very few cases recorded in which the infection has been through wet salted hides, case 15 of this paper being one possibly from the latter (see also Case 91 in report of 119 cases, London) (Reference 4).

The hide is dried in the sun and every opportunity is given for the bacillus to form spores which resist drying and other processes detrimental to the bacilli. These spores remain adherent to the hair or wool, probably matted in with mud &c., The hide is sent into the market and is sold and e.g. let us say in China and shipped to Liverpool. They are packed in bales not very carefully secured. In consequence of rough handling these become opened, the hides are exposed and the dust containing anthrax spores is liberated into the hold of the vessel, there to contaminate other merchan-

dise or the next cargo. Those engaged in unloading the ship, the carters and men engaged at the warehouse to which the hides are consigned are all exposed to infection. In the meantime the hides in most cases as I have myself witnessed, are not stored on a floor or room by themselves but among other merchandise this is a most unsatisfactory arrangement. A buyer comes to the warehouse and some of the bales are opened and the hide exposed for his inspection; during this process the dust containing the spores is freely scattered.

If the hides are sold they are conveyed to the tannery in carts and as often as not here again the hide has a chance of contaminating other goods.

At the tannery the hide is dumped down in a corner among other hides to await its turn to undergo the process of leather making. It is during the early stages of this process when the hide is being handled in the dry state that the tanner runs the risk of inoculation.

Precautions are advised and rules laid down by the Home Office in reference to the handling of foreign dry hides; as to how far these are adequate, and how far they are observed I propose to discuss later.

Having given a brief account of the nature of the disease Malignant Pustule and its source, the cases must next demand our attention.

C A S E S

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Case 1. Male aged 27.

Sent to Hospital by local doctor as "possibly anthrax". Patient healthy man, clean shaven, (shaving every other day)labourer in a tanyard, employed in handling dry hides and skins. Believed the hides handled were Chinese hides: this was verifiedlater. Four days previously had noticed a small pimple on his neck (left side) but did not take much notice of it, no pain, itched a little, and may have scratched the head off it. The pimple became larger and very painful: at the same time he stated that some lumps developed in the throat, making the act of swallowing painful. On the day of admission patient was feeling so bad, being hardly able to swallow and felt as if he must soon choke, that he called his doctor in who advised him to go to the Northern Hospital for an opinion and treatment if necessary.

On examination: there was seen a very definite malignant pustule on the left side of the face just behind and a little above the angle of the jaw. The centre was nearly the size of a threepenny piece and quite black whilst immediately around the necrosed area there was an ill-formed ring of vesicles some having been broken probably by handling or through contact with articles of clothing. The

cellular tissue around was very much inflamed and undurated so that the outline of the jaw was obliterated, the oedema filling up the hollow behind the lobe of the ear. The oedema extended to the middle line of the neck anteriorly, well below the jaw, so that the Trachial and laryngeal land marks were becoming obliterated. Temperature 103.8, pulse 90 and breathing rather laboured. Tongue thickly coated and inclined to be dry.

Taking the appearance of the man's neck and occupation there was no difficulty in diagnosing Malignant Pustule. Some of the serum was examined from a vesicle and found to be loaded with Anthrax Bacilli.

Within a few hours patient was given Ether and operated on, his temperature being 104.2 F and breathing more embarrassed. A circular incision was made about three inches in diameter round the pustule going well below the base of the necrosed area, and including a good portion of the indurated tissue. This incision was extended at the lower posterior margin as the edge looked rather suspicious being greeny-black in its deeper parts.

Pressure forceps used on the larger bleeding points, pure carbolic acid freely applied to wound which was packed with carbolic gause, hemorrhage being free and rather troublesome.

Four hours later temperature 103.8 F, breathing better and feeling much relieved: at 4 a.m. temp. 103 F, and at the first dressing 9 a.m. temp. 102 F. Pulv. Ipecachuano Co. was dusted freely into the wound at each dressing and the same drug 5 grs. given internally every 4 hours. Temp. fell gradually until the third day after admission when it reached normal. On the fifth day after admission it rose to 101.4 F and as one margin (lower posterior) of wound looked very red a carbolic poultice was applied. Next day the temp. came down to normal.

Patient's bowels rather constipated, given Calomel gr.5. During the first three days had whisky ℥ VI in 24 hours. He made a good recovery and wound healed up having a much smaller scar than one would have expected from so extensive a raw surface.

REMARKS ON CASE 1. Employment, Chinese hides. Four days previously noticed pimple. Absence of pain but itched a little. Patient in the habit of shaving every other day. Pimple became painful, difficulty in swallowing, great oedema of neck threatening to obstruct breathing and swallowing. Constitutional symptoms well marked, high temp. Anthrax Bacilli demonstrated. Incision fairly extensive including base of area and most of the indurated tissue, extention of incision. Marked improvement after operation.

Use of poultice to allay inflammatory mischief. Case rather a bad one on admission on account of the oedema spreading in the neck.

CASE 2. Male aged 19.

Tanner, being employed at same tanyard as Case 1, doing very similar work. Patient stated that he had a boil on the back of his neck, his chief complaint being stiffness of neck, otherwise said he felt alright. First noticed "boil" 4 days ago.

On examination: On the posterior aspect of neck a very marked brawny swelling in the centre of which was a necrosed area in size less than a threepenny piece slightly raised with the remains of broken vesicles surrounding it. This necrosed area was situated in the middle line of neck. There was well marked oedema of neck.
Temp. 101.6 pulse 92. Respiration 28. Tongue furred, urine acid, high specific gravity, no albumen or sugar. Some serum was taken from margin of necrosed area but unfortunately through some mistake the specimen was destroyed before demonstrating the bacillus.

Diagnosis very straightforward from appearance of lesion and history. Operation under chloroform in the course of two hours.

Free excision of pustule going quite 1½ inches on either side of centre eschar. Pure carbolic freely applied to wound, wound packed with cyanide potassium gauze in 1 in 20 carbolic lotion.

Patient passed a good night and next morning temp. 100 F, pulse 80 and altogether felt much easier. Pulb. Ipecac. Co. 5 gr. doses every 4 hours with local application of same to the wound. In the evening patient's temperature ran to 102.2 F pulse 90, respiration 26. Bowels acted four times during the day. Brandy given 3 1V in 24 hours. Patient rather restless during the night and in the morning temperature 102.4 F pulse 95, respiration 28. On examination of wound nothing could be seen there to account for this. In the evening temperature I04.F pulse 95, respiration 30, and the neck seemed more inflamed and swollen. Quinine 5 gr. doses 4 hourly given and hot fomentations applied to wound and neck. Bowels open once during day, urine faintly acid.

Pulse getting very weak and irregular and patient seemed more distressed in his breathing. Strophanthus given. Next day being the third day after operative interference, temperature rose to 104.8 at 4 p.m. pulse 106, respiration 30, urine alkaline, unable to demonstrate any bacilli. Hypodermic injection of Strychnine given at 8 p.m.

At 12 midnight temperature 102.4 F pulse 110, respiration 38 and much embarrassed, oedema spreading in neck. At 4 a.m. fourth day, temperature 103.4 F pulse 130, respiration 44, hypodermic injection of Strychnine given, followed a little later by Hypodermic injection of ether. At 12 noon temperature 103.4 F, pulse 137, respiration 49. Neck very much swollen obliterating the landmarks, breathing very laboured, patient cyanosed. Tracheotomy done without any anaesthetic. This operation was a very difficult one as the oedema had displaced the trachea to the right of the middle line. Patient's breathing relieved for some six hours when he died from heart failure, failing to respond to stimulants, strophanthus, ether and strychnine.

Fifty-six hours after death an examination was made. Patient rather emaciated and evidence of rickets present. Decomposition had set in, On opening the thorax the left lung was found to be collapsed somewhat. Both pleural cavities contained a large quantity of slightly turbid fluid, the right lung had a consolidated patch at apex over which the parietal and visceral pleurae were strongly adherent (probably tubercular consolidation). Along the anterior borders there was some slight emphysema, weight 24 ozs.

Left lung was more emphysematous and weighed 18 ozs.

Larynx, evidence of oedema of glottis present.

No patches found. Tracheal mucous membrane very congested with haemorrhagic patches here and there. Throughout it was filled with a deeply blood stained frothy material. The bronchial glands were enormously swollen, very friable and contained a blood stained gelatinous material.

Heart. The pericardial cavity was much distended with a slightly blood stained fluid. The heart itself appeared cloudy, weighed 12 ozs. no valvular disease present.

Liver. Very much enlarged, fatty and weighed 68 ozs.

Spleen. Very diffluent, a mass of dark greenish fluid, weighed 7 ozs.

Kidneys normal, each 6 ozs.

Microscopical examination failed to discover the bacillus Anthrax in any of the organs or fluids.

In spite of the unsatisfactory attempts to demonstrate presence of the Bacillus, there can be no doubt that the patient had malignant pustule, and general infection ~~with~~ by the organism.

The evidence of the post mortem pointed in no uncertain manner to the latter, the reason of not demonstrating the Bacillus in what appeared such a plain case of general infection, I can only explain by quoting Professor Greenfield from the Brown Lectures, Lancet, Vol. 1, 1881, in which he comes to the conclusion after a most exhaustive examination

im cases at Bradford amongst the wool sorters of malignant pustule and internal Anthrax that decomposition destroyed the Bacillus very readily.
(Also Klein - 6). (Prof. Greenfield 6).

Points in case. Definite history, common site, constitutional symptoms, present although patient himself complained chiefly of stiff neck. In the habit of shaving. Unable to demonstrate Bacillus. Spread of oedema. Relapse - condition of general infection. Delay in seeking treatment.
Post Mortem examination poimted to general infection.

CASE 3. Male aged 27.

Came to Hospital complaining of a "bad sore" on the back of his hand. Worked in a tanyard (not same yard as in Cases I and 2). Had been handling dry hides, found to be Chinese hides. Four days ago noticed a pimple on the back of his hand which took bad ways getting dark in colour. Patient healthy man, fairly well developed.

On examination: On the posterior surface of metacarpo-phalangeal articulation of right thumb a small eschar with ring of ruptured vesicles and surrounding induration of tissues. The thumb and hand were not very much swollen, much less than one would expect. Temp. 99.8 F. No other synptoms.

Anthrax Bacillus demonstrated from vesicles. Little or no pain complained of.

Anaesthetic administered an hour or two after admission and pustule excised with a good portion of indurated tissue making a wound about the size of a crown piece. Pure Carbolic acid applied. Also internal, and External use of Pulv. Ipecac. Co. Patient made an excellent recovery being discharged in four weeks. Patient seen some months later very useful thumb and very little to show for operation.

Points in case. Definite history, very little pain, and absence of any constitutional symptoms.

CASE 4. Female aged 36. Washerwoman.

This patient was sent in by an outside doctor suffering from "Anthrax".

Patient first noticed a pimple three days ago on her face but did not attach any importance to it until it got a "nasty" colour and her face became swollen. No pain complained of.

On examination: On the right side of face and neck a hard brawny swelling in the centre of which raised slightly was a very typical malignant pustule. Not much oedema. Diagnosis confirmed by finding Anthrax bacillus in serum of vesicles. Temp. 100.3 F. In the course of an hour or two the Patient was given chloroform and the necrosed area with indurated tissue freely excised, leaving a wound quite three inches in diameter involving part of face and upper part of neck. Pure carbolic acid

applied and Pulv. Ipecac. Co. applied to wound also given internally, 5 grs. every 4 hours. Patient made an excellent recovery displaying no further symptoms and was discharged in 3 weeks.

Points. Occupation. Had washed some clothes used by a tanner employed at one of the tanneries in which cases had occurred. This seemed the only possible source of infection though one could not say definitely that the woman got infected from the clothes. Absence of pain and constitutional symptoms. Oedema not marked.

CASE 5. Male 36. Labourer: had been working in a tannery seven days ago but not since. Stated that he had been wearing the clothes he had worn at his work in the tannery (same tannery as Case 1.)

Four days before coming to Hospital had noticed a pimple on his arm which did not improve, the arm swelling and pimple of a dark colour. The day after he noticed this pimple on his arm, he noticed a small pimple on his chin but no swelling. As the two pimples became worse he decided to come and see the Hospital doctor. Did not feel ill, arm a little sore.

On examination: situated on the back of the right forearm, about the junction of middle and lower third, was a typical malignant pustule with considerable induration around and oedema extending

well up arm. Glands felt in axilla. On the lower jaw about two inches to the right of the symphysis there was seen another malignant pustule smaller in size and with less induration and oedema around. Temp. 98 F. No constitutional symptoms. Anthrax Bacillus found in vesicles of both. Patient healthy, clean shaven. Treatment, excision of both pustulae under anaesthetic, pure carbolic, Pulv. Ipecac. Co. internally and externally.

On the second day after operation temperature rose to 101.6, arm looking very angry, being very swollen. Carbolic fomentations applied 4 hourly. Next day arm looked much better and from this on patient made rapid progress towards recovery. Discharged in six weeks.

Points. Absence of pain and constitutional symptoms, uncleanliness. Seven days away from tannery and wearing working clothes all the time. Possibility of spore working through clothes or infected at work when sleeves rolled up. Double inoculation.

CASE. 6. Male, 22.

Worked in a tannery same as in Cases I, II & 5) Had been three years handling dry hides. Patient came to Hospital as he was afraid the "boil" on his forehead was Anthrax.

Three days ago first noticed a pimple on his forehead. Did not take any notice of it but seeing it get black made him anxious. No pain.

On examination: A litie to the left of the middle line of the forehead and just at the margin of the hair was a small black area with one or two ill formed vesicles at the edge. There was not very much induration or oedema. Temp. normal, no constitutional symptoms. Anthrax Bacillus demonstrated in vesicles. Treatment at once, excision &c. same as in other cases mentioned except Pulv. Ipecac. Co. not given. ad finit. That night temperature 99.8 F. Next morning 99.4. Edges of wounded Pulv. Ipecac. Co dusted into wound and given internally in 5 gr. doses 4 hourly. Hot boracic fomentations applied and as bowels had not acted since admission calomel 5 gr. given. Temp. 99F. next morning. OI. Ricini given as bowels had not acted. Wound and surrounding parts less angry. During night bowels acted twice well: in the morning, temperature normal. Continued todo well and was

discharged in seven weeks.

Points. Site, occupation, absence of pain and symptoms. Ipecac. not given at first as did not seem very bad case but when temperature rose given internally and externally. Fomentations very useful. Purge may have brought temperature down.

CASE 7. Male, 2I.

Employed in a hide warehouse handling dry hides (Chinese).

Patient complained of a "boil" on arm which he said was taking on bad ways.

About four days ago he noticed a small pimple on his arm which itched a little, but no pain.

This gradually became black and his arm became red and swollen. Patient stated that he felt well enough in himself.

On examination: Situated on the anterior surface of middle of forearm a black eschar about the size of a sixpence with ring of vesicles mostly ruptured with brawny swelling around. Just above the elbow on the same arm a very small necrosed area with one or two vesicles at margin, very little induration and swelling.

No constitutional symptoms. Temperature normal. Anthrax Bacillus demonstrated from vesicles.

Treatment, same as in other cases (I to 5). Patient's temperature never above normal, discharged in 4 weeks, having done very well.

Points. Double inoculation on same arm. Occupation. Absence of pain or symptoms other than local. Site of inoculation.

CASE 8. Male aged 28.

Patient worked in a warehouse, handling foreign dry hides (Chinese hides), different warehouse from Case 7. Admitted complaining of a boil on his neck which was not getting any better. Had first noticed pimple six days previously but had attached no importance to it. His neck becoming swollen he came to Hospital for advice. Felt pretty well in himself. Clean shaven.

On examination: situated on the right side of neck was a black area almost the size of a shilling piece with what had evidently been a ring of vesicles surrounding it. The central necrosed area was slightly sunken. There was very marked oedema of right side of face and neck.

Temperature 102. F, but otherwise did not exhibit any signs of constitutional disturbance.
Anthrax Bacillus found in serum from vesicles.

The pustule was at once freely excised with

the same treatment as in other cases. The patient showed marked improvement next morning the oedema being much less and temperature 99 F.

Patient made a good uninterrupted recovery being discharged in six weeks.

Points. Occupation, site, shaven.
No marked constitutional symptoms. Six days had pimple, large size of eschar, slightly sunken.
Rapid improvement following excision.

CASE 9. Male aged 25.

Patient, a tanner same yard as Case 3, admitted with a typical malignant pustule on the left side of neck under the chin and a little from the middle line. Had noticed a pimple five days previously and had not been feeling so well. Consulted his doctor who sent him to Hospital. Patient had not come direct to the Hospital being distinctly under the influence of drink, having been screwing up his courage as he put it to get this anthrax treated.

Patient, a very big powerful man, clean shaven, i.e. in the habit of shaving.

There was considerable induration of tissues in the neck and oedema extending well over to the right side of middle line.
Temp. 100.2, pulse rapid.

Temp. 100.2, pulse rapid.

Anaesthetic, chloroform given, and operated on as in other cases, but not as completely as we wished on account of his behaviour on the table. He vomited very profusely bringing up great cubes almost, of undigested meat and vegetables causing great anxiety to those engaged. All the time he struggled very violently, having to be held down. The actual cautery was used very freely in addition to the carbolic acid. Next day temp. 99.8, wound dressed and Pulv. Ipecac. Co. dusted into the wound. Neck very red and oedematous, hot fomentations (carbolic) applied.

Patient seemed very weak, Hypodermic Injection of Strychnine given, and Pulv. Ipecac. Co. 5 grs. 4 hourly which he vomited. Temperature 102.3 that evening, pulse rather rapid and weak. Edge of wound near middle line rather dark looking and very hard. Next morning temperature still up 101, retained Pulv. Ipecac. Co. Morphia was being injected one—sixth of a gr. On examining the wound the edge near the middle line had become black, oedema increased and breathing rather embarrassed.

Being afraid of oedema of glottis another operation was performed removing the necrosed tissue with about two inches of indurated tissue making the whole length of the wound about 4½ inches. At the widest part the wound was about 2½ inches so that there was a very large wound in patient's

neck. Pure carbolic, pressure forceps and actual cautery used. In the evening patient's temperature was 99.6 F, breathing better, stimulant brandy ℥ VI in 24 hours. Temperature in the morning 99.8 F. hot fomentations applied, also Pulv. Ipecac. Co., oedema much reduced and breathing very much better. Evening temperature 99.F, patient much improved. The following morning temperature almost normal, and from this time on patient made an uninterrupted recovery, being discharged as an outpatient in seven weeks. The ultimate scar was almost linear and almost imperceptible, patient growing a beard and feeling no discomfort.

Points. History, tanner fron yard in which cases had already occurred. Site: shaved:alcoholic. Second operation necessary, threatened oedema of glottis. Pulv. Ipecac Co. vomited, stomach probably diseased from drink. Morphia may have assisted in keeping it down. Evidently all infected tissues not removed at first operation. Result in spite of extent of incision.

CASE IO. Female aged 18.

Patient strong looking young girl but evidently very ill. Occupation, wool-sorter. Patient had been sent in by an outside practitioner, as suffering from "Anthrax." Patient stated that she.

had been handling wool, and that four days ago she had noticed a pimple on the right side of her face which she had paid no heed to as it was not painful. This morning her face was so swollen and painful that she consulted a doctor.

On examination, a well marked pustule just anterior to the angle of the right lower jaw. Great oedema of face and neck, temperature 103. F. Marked dyspnoea, pulse very rapid and inclined to be irregular. Tongue very furred and dry. Anthrax Bacillus demonstrated from vesicles. Operation;-chloroform administered, necrosed area removed with an inch all round of indurated tissue. Pure carbolic, pressure forceps and thermo cautery. Temperature in evening 102 F. breathing improved and oedema diminished. Brandy and Strophanthus given, pulse being rapid and irregular.

Wound dressed in the morning and Pulv. Ipecac Co. dusted in, also given internally 5.gr.doses every 4 hours. Temperature 100. F, patient very much better, pulse now being regular and slower. Fomentations applied next day, Temperature 98.8F, and from this on patient madd a good recovery. Discharged in eight weeks.

Points. Occupation, site. Constitutional symptoms well marked, clearad up rapidly after treatment. ~~(Rhotograph)~~.

CASE II Male aged 42.

Patient admitted complaining of a boil on his neck. States there was a pimple that itched three days ago which he might have scratched with his finger nail. Patient worked in a warehouse and had been handling hides, probably Kurrachee hides. These Bombay hides were looked upon as fairly safe by the trade. There were other hides and skins in the same warehouse. Patient in the habit of shaving. On examination a well marked malignant pustule on right side of face with oedema extending into neck. Constitutional symptoms none temperature normal and patient was much against having an operation not understanding the nature of the disease. However, when given to understand that unless something was done soon there was a very big chance of his losing his life, he consented. In this case the absence of any constitutional symptoms was very marked, patient feelig quite well in himself. Bacillus Anthrax found in vesisles.

Chloroform given and pustule freely excised, going well outside pustule and clearing out most of the indurated tissues. Pure carbolic applied, pressure forceps on larger vessels and actual cautery Pulv. Ipecac. Co. dusted into wound, also given internally. No vomiting, fomentations applied. Temperature never rose above 99.2 F and patient

made a good and rapid recovery, being discharged in four weeks.

Points. Marked absence of constitutional symptoms. Itching of pimple, possibly pimple then scratched and thus infected. Source of infection hide warehouse, Bombay hide. Shaven.

CASE I2. Female aged 25.

This patient was the wife of a carter. After making careful enquiries it was found that the husband had conveyed dry hides from a hide warehouse in which Case II had worked, to a flat, the hides being destined for some tannery at Warrington. He had handled these hides in the loading of his cart and at the end of the week his wife washed his clothes. About five or six days after patient noticed a pimple on her face, right side, and then two days later there came a sore on the left side of her face. Does not remember scratching her face but sometimes had pimples which itched. Noticed first pimple four days ago. Had been confined five weeks ago and had child in her arms when she came to Hospital complaining of two bad sores on her face which had got much worse during the last few days, being painful, red and swollen.

On examination: situated in the right cheek was a necrosed area about the size of a threepenny piece

with remains of vesicles surrounding it. Face on right side very tense and red. Near the left eye towards the outer angle another very similar area but not so large, vesicles unruptured. There was some redness and induration of tissues around, the eye being half closed but less than on right side of face. Patient complained of some paid. Temperature 100, otherwise seemed fairly well. Anthrax Bacillus demonstrated from vesicles near left eye, but unable to demonstrate them from right pustule, vesicles being ruptured and serum dried. Chloroform given at once and both pustules excised as freely as possible considering the sites. The same local treatment was applied, greater precaution having to be observed near left eye with strong antiseptics. Pulv. Ipecuc. Co dusted into wouhds. Patient's temperature at operation 101 F. This remained up for three days varying between 99 F. and 100.3 F. Vomited first few doses of Pulv. Ipecuc. Co 5 grs. Hypodermic injection of Morphia given, one sixth, and repeated six hourly which seemed to enable her to keep the Ipecac. down. Fomentations applied and temperature settled down, patient eventually doing very well, being discharged in nine weeks. Wounds healed very well leaving little more than a linear scar over both sites.

Points. Occupation, housewife. No direct contact with hides, but her husband had, and she had washed his clothes. It is very probable that in some way the husband conveyed the infection to his wife, most probably in the handling of his clothes. Excision not quite so free as usual on account of site. Vomiting caused by Pulv. Ipecac. Co. controlled by morphia. Some pain complained of. Double infection.

CASE I3. Male aged 5I.

Labourer in a hide warehouse. Patient brought by foreman having complained of a sore on his neck. Foreman was suspicious of "Anthrax" as there had been some Chinese hides in the warehouse recently. Patient looked much older than his years and rather debauched. Slightly under the influence of alcohol and the foreman volunteered the statement that patient was a very intemperate man, and to use foreman's own words "just the sort of chap to get "Anthrax" and die."

Patient had first noticed a boil on his neck six days ago but had said nothing about it though he was aware that the Chinese hides were considered dangerous and that the men had been warned to take all possible precautions in the handling of same. Did not experience any pain until about 24 hours

after. Shaved as a rule but had not done so for a few days.

On examination, there was seen a typical malignant pustule situated about one inch below the left ear and half an inch behind the angle of the lower jaw. There was very little oedema, the necrosed area being about the size of sixpence and arear of induration being about two inches in diameter. Gland swollen and painful. Temperature 99. Anthrax Bacillus demonstrated from vesicles.

As soon as possible a free excision was made of pustule and surrounding tissues, some of the fibres of the sterno mastoid muscle being removed. Pure carbolic was applied, also actual cautery and thermo cautery. Pulv. Ipecac. Co. dusted into the resulting wound. Temperature next morning was 99.4 F and in the evening temperature was 100 F. and on examining the wound there was seen some fresh vesicles about 1½ inches behind the posterior margin of wound. Induration and oedema extending well round to back of neck.

Patient given an anaesthetic and the induration tissue freely and deeply excised. Pure carbolic acid and cautery again used, Ipecac. dusted in. Pulv. Ipecac. Co. ℞ xii was also given internally but vomited. Nepenthe 15 m. doses given morning and night, which seemed to assist patient in keeping

Pulv. Ipecac. Co. down. Temperature in the evening 100. 2 F, Pulse 108, irregular, respirations 28 and patient appeared very ill. Pulv. Ipecac. Co. increased to 12 grs. three times a day which he kept down. Passed a restless night and morning temperature 101.4 F, pulse 112, irregular and respiration 36. Tinct. of Strophanthus given with ℥ss brandy four hourly but pulse did not seem to improve under it.

On examining the wound a black area under the skin was seen at the posterior margin of the wound. Tissues indurated and oedema spreading down towards the clavicle. Chloroform again administered and necrosed area with indurated tissue very freely excised, incision extending almost to the clavicle and round to the back of the neck. Pure carbolic and actual cautery used.

A few hours later the patient died from heart failure the temperature falling to 98.2 half an hour before death.

Unfortunately there was no P.M. ordered by the Coroner and the body was removed without any further examination being made. The remarkable fact about the case was that the three incisions were very extensive in fact the most extensive I have ever seen in such a case and yet each time in a few hours there were large black areas of necrosed tissue developed.

This necrosed tissue always appeared at the posterior end of the wound. There were no physical signs of pulmomary trouble, the lungs being carefully examined, nnr were any features in the case pointing to intestinal infection. Delay in seeking medical advice, having noticed "boil" six days before coming to Hospital and the fact that the man's tissues were sodden with alcohol seem to me reasons of the case proving fatal.

Very large doses of Pulv. Ipecac. Co were given him and freely used externally. There was no evidence of oedema of glottis though the neck became so much involved.

CASE I4. Male aged 43.

Patient worked among dry hides which turned out to be Chinese hides. Healthy, clean looking man clean shaven. Same tannery as Case I. Noticed a boil on forearm four days previous which had got worse and as he had heard of other cases of Anthrax occurring recently became alarmed and sought advice at the Hospital. Temperature IOI F. Man felt quite well in himselfexcept a slight headache. Arm not painful or itchy.

On examination, situated at about the junction of middle and upper third of forearm anterior surface, was a fairly typiaal malignant pustule, not

very much induration, some redness and oedema around. Anthrax Bacillus demonstrated from vesicles.

Operated on at once, free excision, pure carbolic acid, cautery, and Pulv. Ipecac. Co. dusted into wound.

Patient's temperature normal in the morning, Pulv. Ipecac. Co. grs. 5, 4 hourly. Made an uninterrupted recovery, being discharged as an outpatient in ten days, wound having been treated for five days with boracic fomentations which cleaned wound up leaving a healthy granulating wound.

Points in case. Occupation, no constitutional symptoms displayed, no pain or itchiness.

Definite history as to source of infection.

Site of lesion.

CASE 15. Male aged 35.

Patient came to Hospital complaining of a sore neck from a bad shave. Occupation, labourer in a hide merchants where only wet salted hides were handled, there having been no dry hides in the place for nearly eighteen months. Two days ago patient noticed a pimple on his neck and that evening was shaved by a barber, the top of the pimple being cut off. Next day he noticed his face and neck to be swollen and red but experienced no pain, and went to his work as usual. During that afternoon his face and neck became rather painful. On his way home he called at a sixpenny doctor's who told him to poultice his neck and it would be all right. Poultices gave no relief. Next morning (Sunday) the swelling had increased causing great pain which extended across breast & down arms. Was perspiring freely, great thirst and altogether felt sick and depressed. Decided to come to the Hospital for advice.

On examination: temperature 99 F. Healthy clean, strong looking man. Situated on right side of neck and face a large brawny swelling in the centre of which just below the ear and posterior to angle of the lower jaw was a necrosed area not quite the size of a sixpence slightly raised from swelling. A ring of ruptured vesicles around eschar. Bacillus obtained from some dark coloured exudation

in neighbourhood of necrosed area. Patient admitted at one P.M. and at two P.M. Temperature 99.6 F. and feeling much worse. He was operated on at 3-30 p.M. A free excision of pustule and indurated tissue around. The actual cautery and thermo cautery applied, larger vessels being compressed and tied. Pure carbolic acid freely used to raw surface. Pulv. Ipecac. Co. dusted into wound.

Patient had a slight rigor at 7-30 p.m. Temp. 100.6, pulse 100, given Quinine gr. X and Pulv. Ipecac. Co. gr. 5. At midnight temperature 99 F. at 4 a.m. 98 F. pulse 80, 8 a.m. temperature 99.2 F. at 12 noon 99.6 F. pulse 89, 4 p.m. temperature 102 F. pulse 100, and at 8 p.m. temperature 102.6 F. Edge of wound very red and indurated but did not progress any further. Fomentations ordered wrung out in weak chlorimate of soda. The temperature remained at 102 until 4 p.m. the next day when it rose to 103.8 F. pulse 110. At 7 p.m. 10 c.c. of anti-streptococcic serum given. Patient taking Pulv. Ipecac. Co. 5 grs. every four hours and Quinine gr. X twice daily. At 8 p.m. temperature 103. and at midnight 101.8, pulse 105. At 4 a.m. next morning temperature 99.8 F. pulse 88: at 8 a.m. temperature 100 F. at 12 noon 99, pulse 80.

From the fourth day the case went straight ahead

patient doing very well, being discharged in six weeks. Some months later I had an opportunity of seeing patient while on a visit to the hide warehouse to which he had returned. The resulting scar was almost linear with a tendency to keloid formation. Patient complained of no stiffness of the neck from contraction.

Points. Occupation, handling of wet salted hides. considered quite safe. I find there was another case of infection from wet hides in London (Reference 4). No dry hides had been dealt with at this man's working place for eighteen months. If not from wet salted hides the source of infection may have been from sacks containing "volona," an Italian acorn used in tanning hides. These firms import the "volona" and sell it in sacks to tanners and it may possibly be that some of the empty bags returned to the hide merchants had become infected. This theory was laughed at by the trade but nevertheless certainly is a possible theory for infection of the patient.

Common site of lesion, neck: in the habit of shaving. Rise of terperature the day after the operation. Constitutional symptoms marked.

As regards anti-streptococcic serum the temperature had just started to fall when it was given and how far the one dose had anything to do with the subsequent gradual fall I cannot say. Quinine used in X gr. doses twice daily may have assisted. Fomentations cleared up induration of edge of wound.

GENERAL COMMENTARY ON THE CASES.

Out of the fifteen cases mentioned, twelve were males and three females. As regards age, one female was aged 36 (Case 4) another aged 18 (Case 12) and the remaining one aged 25 (Case 7)

Among the males most were under 30 years of age, case 5 being 36, case 9 aged 42, Case 8 aged 51. Case 14 aged 43, and Case 15 aged 35 (Reference 8)

In the report issued by Dr. Hamer on 119 cases that occurred in London between 1873 and 1894 the ages were recorded in 117 cases and 62 of them were over 30 years old. From these cases there is not much can be drawn as to any age being more susceptible than another. As regards sex of course men are almost exclusively employed in the trades affected.

Occupation. All the men were either employed at tanneries or warehouses in which hides and skins were handled. In the case of the women one had been sorting wool, while the other two had washed the clothes of men that had been handling hides.

SOURCE OF INFECTION

There were two tanneries and three hide warehouses involved and in all cases but one, the hides were dry and with few exceptions Chinese hides. Case 11 was due to infection from Bombay hides; dust and scrapings from these hides was exmined by a bacteriologist connected with the Liverpool School of Medicine, and the

Anthrax Bacillus unmistakeably demonstrated.
(Reference 9)

Bombay hides have been held to be fairly safe by the trade. In Case 15 the man had been handling only wet salted hides, British or American, the firm where he was employed having ceased to deal in dry hides and skins since the last case among their employees some 12 months previous.

CASE INCIDENCE. The first seven cases occurred almost in epidemic fashion and were all traced to Chinese hides, the remaining being more or less sporadic. There were three other cases reported about the same time from other institutions in Liverpool, all of them being fatal. Case 1 was the first case of the epidemic, then two cases elsewhere both fatal, and then came cases 2 here recorded, also fatal, so that in the first cases the infection appears to have been more virulent than in those occurring later. No deduction can be drawn from this except that the Bacillus varies in virulence for the human subject,

Onset.
~~One set~~ of Symptoms In several cases although constitutional symptoms were fairly well marked the patients did not complain of any pain and felt fairly well in themselves.

With regard to pain Prof. Greenfield states (6) that the pimple may be painless: In these 15 cases we find in Case 1 absence of pain, but slight itching, constitutional symptoms marked, noticed "pimple" four

days previous. In Case 2, (fatal) patient complained of stiffness in his neck only. Although constitutional symptoms were marked, noticed "boil" four days previous. In Case 3 little or no pain, absence of constitutional symptoms, noticed "pimple" four days previous. In Case 4 no pain, no constitutional symptoms. Noticed "pimple" three days previous. Case 5 double infection, arm a little sore, felt unwell, no constitutional symptoms, four days before noticed pimple. Case 6 No pain, no constitutional symptoms, three days noticed "pimple" present. Case 7 No pain no constitutional symptoms, four days previous noticed pimple. Case 8. No pain or constitutional symptoms noticed "boil" five days previous. Case 9, no pain, constitutional symptoms present /under influence of alcohol/, noticed pimple five days previous. Case 10. acute pain on admission and marked constitutional synptoms, noticed pimple four days before. Case 11, No pain, no constitutional symptoms, three days previous noticed pimple. Case 12 some pain complained of, had a temperature of 100°F. No other symptoms, pimple noticed four days previous. Case 13, pain complained of no marked symptoms (alcoholic) two days previous noticed boil. Case 14 No pain, temperature 100°F. slight headache, noticed boil four days previous. Case 15,pain and constitutional symptoms, well marked noticed pimple two days previous.

It will be seen that in most cases, the patients came about the fourth day after first noticing "boil" or

"pimple", the early signs and symptoms are not such as to attract any particular attention and the probability is that in all cases, the disease will make considerable headway before the patient seeks advice.. It has been stated that there is no rise of temperature but I think most authorities would agree that there is a rise of temperature, and a very considerable rise in some instances.

Of the Cases here observed, case 1 had a temperature of 103.8, on the fourth day after noticing lesion. Case 2 temperature 101.6 also the fourth day. Case 3 temperature 99.8° also the fourth day. Case 4 temperature 100.3 third day. Case 5 temperature 98° fourth day. Case 6 temperature normal third day. Case 7 temperature normal fourth day. Case 8 temperature 102.8 sixth day. Case 9 temperature 100.2° fifth day. Case 10 temperature 103° fourth day. Case 11 temperature normal third day. Case 12 temperature 100° fourth day. Case 13 temperature 99 sixth day. Case 14 temperature 101° fourth day. Case 15 temperature 99° second day after noticing "pimple".

So that in these Cases it was rather the exception to have no rise of temperature when first observed. In all the cases except one I think there was a rise in the temperature after admission. I think as regards the stage of the disease and temperature that the temperature is higher in the patients that have delayed seeking advice. No hard and fast line can be drawn because one has no means of being certain on

what day the lesion began, but must rely on the observations of the patient.

Certainly I think that when pain is complained of and constitutional symptoms marked the cases are in a more or less advanced stage and demand all the more urgent and stringent treatment.

Site of Lesion:- Out of the fifteen cases under discussion there were three cases in which there were two pustules, making a total of eighteen pustules. Face and Neck the site of thirteen (13) forearm four (4) and hand one (1). The general view held by authorities is that the face and neck are the commonest site, this fact is borne out in this small number of cases. In the 119 cases mentioned in the report of Dr. Hamer (8) there were 102 cases in which the lesion was situated in the face or neck, the reason advanced for this being that the face and neck are exposed. The hands and arms are not exposed so much, as the men at tanneries and hide warehouses are provided with gloves to be worn when handling certain hides. But these gloves if they protect the hands are also capable of themselves conveying the Bacillus to other parts. The gloves have been shown to contain the anthrax Bassili from infected material. In the annual report for 1899 by the Medical Officer of Health, Liverpool, it is stated that the "Anthrax Bassili" were found in larger quantities in the gloves which the workmen used. With hands thus gloved the men will cut or scratch any pimple or spot that may be

causing any irritation, and cannot fail to infect it if the skin is broken.

Another reason, put forward for this frequency of Malignant Pustule on the face and neck is that hides are carried on the shoulders of the men and this directly infect the face and neck, the hides being exceedingly dry and hard and quite capable of inflicting a wound. On enquiry, the practice of carrying the hides on the shoulder is not so common as is supposed. The fact that all the males in the cases under discussion were in the habit of shaving is rather striking. While shaving one is very apt to cause a small wound on the face or neck, and I maintain that many of these cases are due to this fact. The workman, shaves in the morning, and probably with a none too steady hand. In many cases a slight wound is made, and in the course of perhaps an hour he is at work among infected hides. Again the face and neck are very common sited for small pimples, readily converted into an open surface. The neck is also subjected to a good deal of friction by the collars of mens' coats, which will rub the infective matter into any such pimples &c.,

A double lesion does not seem to be very common which is rather striking, for given one definite focus infection is surely easily carried to another part of the body. The site is very important as regards the prognosis, those situated in the face and neck specially the latter site being very much more dangerous to life. The oedema attendant on the lesion is very apt

if not checked to extend to the glottis, as in Case 2. The question of site is also of much importance in regard to excision of the pustule, free excision in some sites would mean extensive mutilation.

Diagnosis of Malignant Pustule. One of the most essential points in dealing with cases of this disease is an early diagnosis. Once one has actually seen a case, the chances of missing malignant pustule are much reduced. There is nothing else that really resembles it; the nearest imitation I ever saw was in the case of a man working among chemicals. Some powerful caustic has dropped on his arm and when he came to Hospital there was a black necrosed sunken area with some bullae in the vicinity of the patch and great swelling around. On more careful examination and questioning malignant pustule was excluded. The history of the patient specially as regards occupation is a very important factor in the diagnosis, though too much importance must not be attached to the absence of any history of contact with hides etc., This point is brought out by cases 4 and 12, the one a washerwoman, and the other a housewife. The vesicles of the pustule are in many cases destroyed or partially so, but the remains are to be seen round the edge of the necrosed area. As a rule the necrosed area is slightly raised above the brawny swelling of which it is the centre. Constitutional symptoms do not guide much in diagnosis.

In the majority of the cases here recorded there was no great disturbance and in several there was

absolutely none.

In all cases of doubt cultures from the vesicles will decide, but it must only rarely be necessary to wait for this demonstration.

In all cases but Case 2 the Bacillus was demonstrated, but in none was it necessary to wait for bacteriological investigation before commencing treatment.

The bacillus of course can be demonstrated as a rule not only by culture but by making film preparations from the vesicles.

All were fairly characteristic clinically. The necrosed base of the broken down central vesicles, the marginal vesicles or their remains and the intense inflammation taken together with in most cases a very definite history of the patient having been exposed to infection, made the diagnoses simple.

The differential diagnoses seems hardly worth noticing. The two diseases to be considered are facial carbuncle and Anthrax oedema. The former has no vesicle, no central scab, and the veins are blocked with purulent thrombi, while in the latter there is neither the presence of vesicle nor eschar, but only a pale gelatinoid swelling of the subcutaneous tissues, the eyelids being the most common site. (Reference 3)

Prognosis.

In giving a prognosis one would chiefly be guided by the general health of the patient, habit as regards alcohal, site of pustule, stage of pustule. Amount of induration and oedema. Presence or absence of constitutional symptoms.

Treatment.

Recovery may take place without any special treatment, even when severe constitutional symptoms have supervened. The mortality appears to be about I in 4, treated without incision. (Reference 3) (Also Professor Greenfield (6) states that recovery may take place without any treatment. As a rule however treatment of some kind is adopted, the one most in vogue being that of free excision.

Before referring to the latter some others may be noted.

The giving of Carbolic Acid internally based on the observations of Bollinger who states that the therapeutical acid of carbolic acid in the lower animals when affected with Anthrax has been proved beyond doubt. (References 3). Two cases recorded see Reference (8)

Pustule excised and patient given eight grains of carbolic acid every four hours. Slow recovery of patient. Pustule in lip. In case 2 lip again the site incised and 6 grs. of carbolic acid given: slow recovery.

The carbolic acid produced no bad symptoms but did not seem to affect the disease to any extent. No mention is made as to how the carbolic acid was actually administered and the treatment seems rather heroic, the object being I presume to convert the blood into an antiseptic medium which I am afraid has not been found practicable.

A rather interesting method is described by a Mexican medical man (see reference (9)). He treated a number of cases of malignant pustule though not bacteriologically confirmed, by the local application of Lye. He made a small trough of dough which he placed round the pustule and into this circumscribed area he put equal parts of wood ash and lime. The cure was stated to be marvellous, without pain and an almost imperceptible scar.

Treatment by injection of pure carbolic acid into the tissues round the eschar. This treatment was adopted in a case recorded where the pustule was situated on the tip of the patient's nose and free excision was consequently contra-indicated of

Patient was also thought to be too ill for operative treatment. 400 injections of 1 gramme of 3 % solution of carbolic acid was given without any toxic symptoms. Reference (10)

The result was good, very little scar and saved mutilation of the nose. This treatment sounds very rational especially in a site where the patient could ill afford to lose any appreciable amount of tissue. By injecting the Carbolic Acid you are thus directly treating this Bacillus in a very powerful antiseptic.

Local application of the actual or thermo-cautery has been recommended. Actual cautery long been used in foreign countries and that alone. This along with the injection of a mixture of Mercuric Chloride and Potassium Iodide was used in the case of a woman (see Reference (3)

Quinine along with other treatment is recommended in large doses (see 6)

Ipecachuana has the reputation of being a specific for malignant pustule and most certainly here are some good grounds for this. To Dr. Muskett is given the credit of making this discovery and in a very interesting article (12) a large number of cases are given in which Pulv. Ipecac. Co. was used both internally and externally.

Dr. Muskett I think found that Morphia given along with the Ipecachuana prevented vomiting.

In some of his cases he preceded the application of Pulv. Ipecac. Co. by blistering the pustule.

As some patients were known to die cyanosed it was suggested by Mr. Bryant (12) to treat the cases by oxygenating the blood to make up for the oxygen removed by the Bacillus. This for many reasons has not found much favour.

Another treatment suggested (13) is to treat the patient with repeated inoculation of the serum of Anthraci Bacillus. Professor Sclavo's serum used in 27 successful cases.

This has not been found successful in the human subject. One attack does not seem to protect from a subsequent attack.

Most authorities recommend strongly early and free excision of the malignant pustule. It is done freely on the Continent. In London, at Guy's Hospital, it is the treatment.

Professor Greenfield (6) recommends it with the use of some strong antiseptic. "If a small pustule, incision and suction by cupping glass or artificial leech should follow. The part then should be thoroughly washed with a strong antiseptic, a solution of Biniodide of Mercury ~~1 gr.~~ (1 per cent) in excess of Potassium Iodide or Corrosive sublimate of same strength preferably combined with Peroxide of Hydrogen to prevent coagulation. Surgical treatment to be deprecated unless the disinfectant treatment can be also carried out."

Billinge (14) advocates free excision.
Mr. Davies-Collier, London. Also advised free excision strongly.

As an argument against free excision it is stated that a natural barrier to the entrance of the Bacilli and its products into the general system is made by nature by formation of necrosed tissue and that by surgical interference you of necessity break down this barrier. I think the risk of causing a general infection in this way certainly does exist but that with skill and precaution this may be avoided.

The line of treatment practised at the Northern Hospital, Liverpool, is a combination of several recognised methods. Very free excision of the pustule cutting well clear of your necrosed tissue and vesicles and removing as much as possible if not all the indurated tissues around the eschar with the almost simultaneous application of such a powerful antiseptic as pure Carbolic Acid which destroys tissues as well as any lurking Bacilli. In addition to this in the last ten cases the cautery was applied freely to the raw surface, checking oozing from small vesicles. With a quick operator, a very sharp knife, followed by such drastic treatment as the pure carbolic and actual cautery I think you run very little risk of setting up general infection.

Great care of course must be observed in keeping the knife and anything that is likely to come in contact with your raw surface from becoming contaminated by the serum from the vesicles.

In addition to this surgical treatment Puly. Ipecac. Co. is freely dusted into the wound and given internally.

The dressing for the first day or so, depending on the case itself, is a dry dressing, carbolic gauze with Puly. Ipecac. co. Then later when sloughs are formed, the application of hot poultices or fomentations assist in producing a healthy granulating surface.

During the patient's illness he requires a good nourishing diet with some stimulant.

RESULTS.

Of the fifteen cases two died, Case XIII being a very bad subject and had noticed a pimple six days before treatment. Bollinger (3) cites the experience of two observers who lost only 13 cases in 142, i. e. for comparison, 9 in the 100. Another observer 11 out of 209, i.e. 5 in the 100. They were all surgically treated.

In 1878 Mr. Davies Colley records 2 cases: in one after excision of entire indurated mass with the application of Chloride of Zinc paste the patient recovered: in the other case no treatment, and the result was death.

In the 119 cases recorded in the Report issued by ~~the~~ S Hauer (reference 5) there were four cases treated by incisions, all of whom died. There were nine cases treated by poultices, Three of whom died. One described as treated constitutionally died, and another case treated medicinally only, also was fatal. One case of cauterization recovered. The other cases were treated by excision simply or with applications of either the cautery or a strong antiseptic or both, Pulv. Ipecac. Co. being used internally and externally in a good number of the cases. The Mortality being 13 in 85 cases i.e. 15 or 16 in 100.

The total number of deaths in the 119 cases was twenty-five, making a mortality of about 21 in a hundred.

The cases under discussion compare very favourably with the statistics, I am therefore very strongly in favour of the combination of methods described being carried out in cases of malignant pustule, holding that by so doing many lives may be saved.

Although it is only in comparatively recent years that the diseases caused by Anthrax have been definitely described in England. There can be no doubt that from time immemorial animals have been affected by the Bacillus Anthracis, and man in his turn from dealings with such animals.

On the Continent Anthrax occurred very frequently and in the last century it was well recognised that malignant pustule ("French" Charbon") was apt to affect human beings who manipulated certain animal products.

As far as I can gather the first case described in this country was recorded by Mr. Lawrence in 1847 Reference(1).

It was in 1849 that the Bacillus Anthracis was first described by Pollender and independently about the same time by Davaine and Branell. Reference(2) ()

In 1852 a series of cases was collected and published by Mr. Harvey Ludlow and in 1862 a paper on this subject was read by Dr. William Budd (Reference(4)

It was not until 1863 that malignant pustule appeared for the first time as a cause of death in England in the Registrar Generals report.

Table showing the mortality from the disease under consideration in England, as recorded by the Registrar General .-

(a) First period (1863-1876) Deaths recorded under the head of Malignant Pustule.-

Year 1863	-	1
" 1864	-	2
" 1865	-	3
" 1866	-	6
" 1867	-	6
" 1868	-	3
" 1869	-	4
" 1870	-	3
" 1871	-	5
" 1872	-	1
" 1873	-	4
" 1874	-	0
" 1875	-	5
" 1876	-	4
14 years	Cases	47

(b) Second Period (1877-1880) The heading Malignant Pustule retained and the headings Charbon & Woolsorters Diseases introduced in 1877 and 1879 respectively.-

	Malignant Pustule	Charbon	Woolsorters Disease.
1877	8	2	0
1878	14	0	0
1879	8	1	3
1880	6	0	12

Making a total of 54 cases in 4 years.

(c) Third Period - the heading Splenic Fever adopted

Third Period.-

1881	-	9
1882		15
1883		8
1884		18
1885		11
1886		11
1887		11
1888		12
1889		7
1890		4
1891		3
1892		6

In 12 years - - - 115 Cases.

These figures cannot be very well used as an argument in favour of the increase of the disease as they have increased through knowledge on this particular subject.

In 1863 Davaine published a paper of the very greatest importance showing for the first time that the Bacillus Anthracis was the cause of the disease Malignant Pustule in man.

In 1876 Koch and other observers as a result of their researches in the matter completed the proof that the Bacillus was the cause of the disease.

From this time on the subject began to attract the attention of Medical men and particularly those engaged in work at Guy's Hospital. Burmondsey,where

the work among hides and skins is of great magnitude, being in the district of that institution.

There in 1878 Dr. Russell of Glasgow drew attention to certain cases of sickness and death among horse-hair workers, chiefly Russian manes termed by the trade "raw".

Most of these cases were affected by "internal anthrax", the name given to that form of the disease in which the lesions are internal affecting either the intestinal tract or pulmonary system, a very fatal form indeed, cases frequently dying after running a very rapid and acute course.

In the paper published by the Medical officer of the Local Government Board for the year 1878 Dr.Russell refers to similar outbreaks at different centres on the Continent.

In Bradford, those engaged in the wool-sorting trade were very frequently attacked by a disease that appeared to be fairly confined to this occupation. Dr. J. H.Bell advanced the theory that these cases were Anthrax, hence the name of "Woolsorters Disease" was applied to internal and external Anthrax occurring in and round Bradford.

In 1880 Mr. Spear in conjunction with Professor Greenfield made an exhaustive enquiry into the matter and as a result many important facts were established and the theory advanced by Dr. J.H.Bell confirmed.

In 1883 Mr. J. Spear published a report on the occurrence of Anthrax in the London Hide and Skin Trades, recording thirty nine (39) cases from 1873-83.

In 1894 Dr. Hamer, Assistant Medical Health Officer for London published a very full report on the occurrence of Anthrax in London and was able to add eighty (80) cases to the thirty nine (39) recorded by Mr. J. Spear.

There does not seem to be any more recent report excepting the statements made each year in the "Animal report of the Chief Inspector of Factories and Work-Shops".

No power to slaughter infected animals was given until the year 1892 when the local authorities were given power to slaughter, the owner having a right to appeal to the Board of Agriculture for compensation.

We must turn our attention to foreign countries as the source of Anthrax in man in Great Britain, for though cases are met with in which men have contracted Anthrax from animals dead of Anthrax in this country, by far the greatest proportion has been from imported hides.

Dr. Fraser reports the occurrence of five cases of direst infection from animals dead of Anthrax, two being "internal Anthrax" and the remainder "External Anthrax" or Malignant Pustule. Reference (15)

In Liverpool a man who had assisted in receiving the carcase of a cow dead of Anthrax Dec. 1895 became

inoculated in his arm (Reference (16)

Isolated cases have been reported of veterinary surgeons becoming affected. Crookshank in his work on Bacteriology and Infectious diseases states a case of a veterinary surgeon who opened a bullock that had died very suddenly and mixed the blood from his hands with some coarse grass which cut his fingers. He developed malignant pustule and had two of his fingers amputated in consequence. Reference (17)

I can find no record of any cases of Malignant Pustule being traced directly to a British hide, dry or wet. In the first place these are alldealt with or the greater proportion of them, in the wet salted state. In the second place the man engaged in work among cattle for the most part are well up in the dangers from infected animals. Lastly the Authorities have the power in the country of dealing with all infectious cases, so that the hides and skins very rarely get into the market.

To resume, foreign hides are a great source of danger and I am afraid as long as they are imported, will continue to be so, unless some more adequate means can be brought into use when such goods are concerned.

This is not merely a question of danger to those actually engaged in the trade but one which concerns those engaged in many other occupations. In the 119 cases recorded in London under the heading of occupations you find such as:- Carman, Assistant in Bacteriological Laboratory., Hydraulic Crane maker, Carter

painter, Van boy, fish salesman, Potatoe-man, house-man, sailor, dyer, housewife, upholsterer, lighterman.

In Liverpool there have been cases recorded occurring altogether outside these trades, considered dangerous from anthrax infection e.g. man working in an Oil cake mill, probability of saaks containing oil cake (prepared food for cattle) being contaminated at some farm or in the carting. Another case reported from a Chemical Manure Factory, horns, hoofs etc., being converted into manure.

Three cases reported in Bristol, one of these was in men engaged in unloading grain in bulk from the hold of a ship and had not carried sacks. The last cargo being one of barley from Magagan a port in Morocco.

The second case fatal, man employed in a granary and the last cargo from Sea of Marmora.

The third case, also fatal, was that of a man engaged in carrying sacks of potatoes, in this case the sacks were stated to have come from Belfast, having previously come from Calcutta full of wheat.

In 1895 15 horses died of Anthrax in London traced to a supply of oats (Russian.) The vessel which had brought these oats, had on the journey called in at Marseilles and there shipped a cargo of Hides, which were placed on top of the oats. Anthrax found in samples of oats.

An inquest was held in London on a man who had

died from Anthrax. He was employed at the Postal Telegraph Factory, Mount Pleasant, and had been engaged in putting on the hinges of the large baskets used for carrying parcels, their hinges were made of leather.

Another man employed at the same place contracted the disease, but recovered.

All these instances have been given in order to point out the dangers that arise in other trades than those commonly regarded as particularly liable, and also the necessity of keeping these infected products entirely separate from other merchandise in the matter. of storage and conveyance.

A feature of the case dealt with at the Northern Hospital was directly traced to hides, the rest of this paper must be devoted to a discussion on the sources of infection and the means of diminishing the risk of infection, if not of stamping it out as far as hides and skins are concerned.

Before going on any further the one case of a girl being infected from wool-sorting is quite unique in the history of such cases in Liverpool. There is very little wool-sorting in Liverpool and the place where ~~then~~ this girl worked was not a large one, only a few hands being kept to sort wool to be sold to the factories in Yorkshire.

The fleeces from which the infection was thought to originate ~~from~~ were fast Indian Fleeces of fair quality.

The girl was engaged in a small room badly

ventilated and with other girls was seated in a low sort of box, and on her knees a kind of tray on which the wool to be sorted was placed.

The room was very dirty and quite unfit for work of this nature. The place has been abolished as the wool broker, if such he could be called, was not willing to carry out the change demanded by the Home Office

In the report by Mr. Spear and Prof. Greenfield a very full account is given of the wool-sorting process and the cautions taken or advised there.

The fourteen cases from hides were with the exception of ten cases traced to Chinese hides and most of them were from one consignment. It has been pointed out that in London Chinese hides proved the most dangerous.

As I briefly sketched before in the short introduction the sort of life history of the infected hide, A more detailed description must now be given in order to be able to criticise the means employed for combating this evil and to suggest further means.

Description of the Raw Material, source of supply &c., Foreign hides (Reference (/8).

The collection of foreign hides is effected mostly through travelling agents who purchase at local markets and bazaars, and forward the parcels to the nearest port. There the hides undergo a rough classification. First, according to the market they are but suited for and secondly (although this is not always carried out)

according to their quality. "Dead" hides i.e. those of animals that have died of diseases or of age are classed inferior.

The "curing" process "wet or "dry" is carried out by the natives. The hide is first "trimmed" and washed, although the cleaning as shown by the frequent appearance of dried blood &c, is by no means perfect.

The Chinese hide are most exclusively those of oxen, and are derived from Mongolia and the district around.Hankow. They are shipped in a partially dried condition in local steamers &c, at Tientsin or Hankow, for Shanghai, when along with the comparatively few collected round that town they undergo the process of curing (the application in some form or other of arsenic). This "cure" as it is termed by the trade is to protect the hides from the ravages of the "worm" (Dermestes Vulpinus)- other countries use differente applications as the steeping in a bath of brine (North West Province of India) salt or earth largely impregnated with nitre (Bengal, Madras and Bombay) petroleum (Rangoon & Penang) solution of lime (in some parts of Bombay). After the application of this chemical the hides are dried in the sun and wind When completely dry the hides are hard and horn-like and are folded lengthwise, generally fleshy side out. The hides,having undergone a rough classification,are put up in bales and may be packed under hydraulic pressure, secured by rope or iron bands or covered merely

with canvas and in some cases the wrappers are inferior hides possibly "dead" hides.

Foreign (or Colonial) skins:- Mainly from sheep and goats, also rabbits. The vast bulk come from Australasia and South Africa and are treated in much the same way as the hides.

Fleeces find their way to Bradford, chiefly, and the most dangerous is that from the Van goat.

Hides and Skins of home productions. - These arrive at the tanneries or feltmongers yards fresh from the slaughter house or knackeries or intermediately from the skin markets and are then known as "market" hide or skins; when sent from any distance they are salted and rolled into bundles.

The Manipulation of the Raw Material in this Country.

The hides and skins arrive in vessels with very few exceptions carrying a cargo of general merchandise. They are transferred from the ship to the broker's warehouse and here stored with other articles. The hides and skins are sorted and samples shown to intending buyers. In this process the dust of the hides is liberated. Hides are sold and are carted away to the tannery when they are dumped down into a corner of the tanner's premises to await their turn. The dry hides are in bales and as hard as nails. They are placed in pits of water to soak that they may become softened. They may now be "stocked" that is beaten with heavy hammers.

The next process lies in "liming" This is simply

soaking the hides in a series of lime pits, this takes two days or thereabouts in each pit. During this process the hides are manipulated daily to secure an even action of the lime. The exhausted lime pit is emptied, the water being run or pumped away, while the refuse is put in a corner of the yard until carted away. Salted hides are treated in the same way practically.

It is hardly necessary to follow the process any further as it is hardly likely that the Bacillus has resisted the prolonged application of the Caustic lime, but briefly the hides are next denuded of their hair by scraping, soaked in water to remove the lime and finally prolonged immersion in the tanning pits.

Skins are soaked,then "burred" i.e.removal of "burrs" "tainting" i.e. producing a mild decomposition to make the pulling off of the wool easier, and here in all probability ends the Bacillus as the spores are encouraged to germinate and there succumb to the action of putrefactive bacteria.

Foreign horns, hoofs and bones used for very many purposes. Some implements, combs, artificial manure etc., these are very liable to cause infection in their early manipulation as they might easily be contaminated.

The By-products of tanneries, their refuse and also that of the hide warehouses have very varied destinations, and herein lies a very potent omen of danger.

"The "parings" and "fleshings" of the tanneries

are used for gelatine or size, the hair to felt manufacturers and plasterers.

The dust of the warehouse rooms and the general refuse of the tanneries, including the sludge taken from the pits pass often direct to the farmers as manure.

It can be readily seen now how many persons are exposed to the risk of infection from any Anthrax tainted hide, skins &c, and how extremely important it is that precautions should be taken to if possible curtail the risk of infection run by so many workers.

I have not treated on the wool-sorting industry, as I have had no personal knowledge of its characters.

The infection from hides and skins seems to have increased during the last few years. In 1898 eight cases were reported in connection with the hide and skin trade. In 1899 there were sixteen, in 1900 there were ten and in 1901 twenty cases were reported.

This of course may be accounted for to a certain extent by the fact that the knowledge of the disease is greatly improved and consequently fewer cases are unrecorded.

One year can hardly be compared with another with much satisfaction as the incidences vary very much, one bale of infected hides causing practically an epidemic, as occurred in the first cases recorded in L'pool from Chinese hides.

Following on these outbreaks enquiries have been held by the Home Office and Public Health Bodies and it

is to the reports resulting from them that most of the information relating to the subject is to be gathered.

Mr. Spear in 1883 made recommendations which briefly were as follows.-

The warning of this country of the existence of disease amongst the cattle &c., of foreign lands. General adoption of some process of cure which would serve not only to protect the skins from the ravage of the "worm", but would lead to the destruction also of morbific germs. Failing this, a classification at the places of export by which "dead" hide would be kept apart to be dealt with after under strict precautions.

Certain prophylastic or palliative measures applicable to individual workshops and individual workers.

The grist then of these recommendations all refer to measures to be taken in the country of export and they are not practicable for many reasons.

The second suggestion is one in which there is much promise, but the process workable is yet to be discovered.

Anthrax spores are so very tenacious of life, resisting certainly all practical chemical reagents

Mr. Spear in concluding his report says "I place in the very first rank of defensive measures the dissemination of a knowledge of the danger amongst workmen and of the precautions that are to be observed in the first symptoms of attack.

As a consequence of this report in 1883 one firm of hide brokers in London caused notices to be hung on

their premises giving briefly a description of the disease, remedies for same and special advice to those handling the skins and hides.

Ten years later in Dr. Hamer's report it is stated that no advance has been made towards the exclusion of infected hides from this country and no practical advance as regards the disinfection of foreign hides before their shipment. As Dr. Hamer found that the same firms as mentioned in Dr. Spear's report still had the same notices up, but that this was the only firm found adopting this course.

In introducing this report of Dr. Hamer's the Medical Officer for London recommends that the Public Health Committee should see that all persons engaged in occupations in which there is risk of Anthrax infection should exhibit notices of precautions and advice. It was shown that during the ten years covered by this report that "dry" hides were going out of ~~form~~ use and that "wet" hides were much more used by tanners but that hide brokers still dealt freely in "dry" hides, sending them abroad again.

Nothing fresh in the way of remedial measures was suggested.

The Government, under the Factory and Workshop Acts 1878 - 1895 issued Special Rules for the handling of "dry" and "dry salted" hides and skins inported from China.

These rules were to be hung in a conspicuous place in all factories or workshops concerned.

Amended Special Rules under the ~~Farm~~ Jams Act were issued in 1901 for the handling of China ~~&~~ West Coast of India "dry" hides.

It will be necessary here to quote these rules.-

DUTIES OF OCCUPIER.

STORAGE OF FOOD AND CLOTHING. 1. Proper provision to the reasonable satisfaction of the Inspector in charge of the district shall be made for the keeping of the workmen's food and clothing outside any room or shed in which any of the above-described hides or skins are unpacked, sorted, packed or stored.

WASHING. 2. Proper and sufficient appliances for washing, comprising soap, basins, with water laid on, nail-brushes and towels, shall be provided and maintained for the use of the workmen, to the reasonable satisfaction of the Inspector in charge of the District.

DRESSINGS. 3. Sticking plaster, and other requisites for treating scratches and slight wounds, shall be kept at hand available for the use of the persons employed.

NOTE TO BE EXHIBITED. 4. A copy of the apended notes shall be kept affixed with the Rules.

STORAGE OF FOOD. 5. No workman shall keep any food, or any articles of clothing other than those he is wearing in any room or shed in which any of the above described hides or skins are handled.

He shall not take any food in any such room or shed.

WOUNDS. 6. Every workman having any open cut or scratch or raw surface, however trifling, upon his face,head, neck, arm, or hand shall immediately report the fact to the foreman, and shall not work on the premises until the wound is healed or is cimpletely covered by a proper dressing after being thoroughly washed.

ARTHUR WHITELEGGE.

Chief Inspector of Factories.

CHAS. T. RITCHIE

One of His Majesty's Principal Secretaries of State.

August 1901.

NOTE I. These Rules must be kept posted up in conspicuous places in the factory to which they apply, where they may be conveniently read by the persons employed. Any person who is bound to observe these Rules and fails to do so or acts in contravention of them, is liable to a penalty; and in such cases the occupier also is liable to a penalty unless he proves that he has taken all reasonable means by publishing and to the best of his power enforcing the Rules to prevent the contravention or non-compliance (Factory and Workshop Act 1891, sections 9 & 11).

NATURE OF THE DISEASE. 2. The danger against which these rules are directed is that of Anthrax, a fatal disease affecting certain animals which may be conveyed from them to man by the handling of hides of animals which have died of the disease.

The germs of the disease (anthrax spores) are found in the dust and in the substance of the hide and may remain active for years. In this country anthrax is rare and precautions are taken to prevent infected hides from coming into the market, consequently there is little danger in handling the hides of animals slaughtered in the United Kingdom; but in Russia, China and the East Indies, and in many other parts of the world, the disease is common, and infected hides (which do not differ from others in appearance(are often shipped to British ports. Hence in handling foreign dry hides the above Rules should be carefully observed. Wet salted hides are free from dust, and less risk is incurred in handling them.

The disease is communicated to man sometimes by breathing or swallowing the dust from an infected hide, but much more usually by the poison lodging in some point where the skin is broken - such as a fresh scratch or cut or a scratched pimple, or even chapped hands. This happens most readily on the uncovered parts of the body, the hand, arm, face, and most frequently of all on the neck - owing either to an infected hide rubbing against the bare skin, or to dust from such a hide alighting on the raw surface. But a raw surface covered by clothing is not free from risk, for dust lodging upon the clothes may sooner or later work its way to the skin beneath. Infection may also be brought about by rubbing or scratching a pimple with hand or nail carrying the anthrax poison.

The first symptom of anthrax is usually a small inflamed swelling like a pimple or boil, often quite painless, which extends and in a few days becomes black at the centre and surrounded by other "pimples". The poison is now liable to be absorbed into the system and will cause risk to life, which can be avoided only by prompt and effective treatment in the early stage while the poison is still confined to the pimple. Hence it is of the utmost importance that a doctor should <u>at once</u> be consulted if there is any suspicion of infection.

NOTE 3. Suitable overalls, protecting the neck and arms, as well as ordinary clothing, add materially to the safety of the workmen, and should be provided and worn, where practicable, if dangerous hides are handled. They should be discarded on cessation of work. Similarly, for the protection of the hands, gloves should be provided and worn where the character of the work permits.

There is no doubt that the dissimination of such notices is of very great importance but I am afraid too much depends on the common sense of the employee.

On several occasions together with His Majesty's Inspectors of Factories for the district of Liverpool I visited different tanneries and hide warehouses.

In all these places a copy of the rules was found sometimes in a conspicuous place and sometimes otherwise. The men engaged at these places get careless and as often as not pay little heed to the rules as to the eating and storage of food, cleanliness &c., and the foreman in most instances has quite enough to do otherwise than to keep the men up to the mark as regards the observation of these rules.

The men engaged in these trades are rather of a poor type, hard drinking being very common among them. At times, where Anthrax is rife so to speak, they may be careful, but the majority of them come to pay little heed to the dangers.

Many places where hides are handled do not come under the Act and carters &c., (casually employed), are in very few instances aware of the dangers attached to handling these products.

As regards the cleanliness of hide warehouses, there is a great deal to be said. Dust lies about thick in all directions, and only in some firms is any attempt made to keep this down by moisture. The reason for not doing so is that the moisture spoils other goods stored in the vicinity.

Now here lies a great factor in the dissemination of Anthrax. All kinds of articles are stored at these warehouses as a rule and thus unlimited chances are given for infection and it must be noted infections likely to be more serious in its consequences, for persons unaware of this lurking danger are thus exposed.

The floors where the hides are stored are swept but it was really astounding to find that in some instances the dust was emptied ~~not~~ on to the street, the possibilities from such a procedure are indeed very great. This is a direct source of danger to the general public.

No wonder that one comes across cases recorded in which the occupation of the patients throw no light on the lesion before the medical man, perhaps seeing malignant pustule for the first time, very valuable time being lost more likely than not.

The wearing of overalls by the workers did not seem to find much favour, indeed the men very rarely carrying the hides on their shoulders.

The gloves used in some instances were found to contain the Bacillus Anthracis and reflexly I have no doubt the gloved hand in many instances is appled to the face and neck so that it is a question whether or not the gloves should be discarded.

In Liverpool as also in London "wet salted" hides are being used in preference to "dry" hides, in fact some firms will now have nothing to do with the "dry" hide. Given a "dry" and a "wet" hide both infected, the former is easily seen to be much more dangerous.

There is the dust, the dry hide is as hard as a board with sharp edges very liable to inflict wounds, and possibly from the knowledge of the life history of the Bacillus in the wet hide you have the Bacillus to deal with as against the spores in the dry hide. The idea held by the trade that the salt destroys the anthrax bacillus is of course fallacious.

Should "dry" hide be no longer imported into this country there would be very few cases of Anthrax recorded, in the hide and skin trade and those indirectly connected with the same.

To sum up the situation as regards the occurrence of Malignant Pustule in this Country, prophylastic measures in the export countries are unreliable and it is left to the trade and authorities in this country to protect themselves as far as is in their power.

In the first place vessels carrying hides and skins should not be allowed to carry other merchandise unless very stringent measures are taken to keep them one from infecting the other.

Vessels carrying cargoes of hides and skins should undergo the most up-to-date method of disinfection before loading again.

Persons storing hides and skins should not be allowed to have on the same floors other products.

The floors of these warehouses should be kept damped with some powerful antiseptic. Any refuse or dust should be at once destroyed by fire.

Precautions should be taken in the cartage of hides and skins, in fact the remarks applied to vessels would apply here.

The clothes used by men in working among these products should be stoved as we would treat articles infected as in Scarlet Fever, only due notice must be given to the greater power of resistance of this particular bacillus.

Too much reliance must not be placed on the employees taking the precautions set down for them, and in my opinion there are many cases that might easily have escaped infection had ordinary care been taken. The wonder to my mind is that there are not far more cases amongst the tannery workers and others engaged in handling infected hides.

The whole matter would be greatly simplified by the discovery of some means by which this Anthrax Bacillus might be destroyed and at the same time articles infected not damaged by the process.

This, I am afraid, is a very difficult matter as the spores of the Bacillus in question shows such an extraordinary tenacity of life. It is stated by Authorities, and I quote Prof. Greenfield that "the spores can be kept in a dry state for an almost indefinite period of time and still be capable of growth when placed in suitable conditions."
Dry heat at 140°C. must be applied for several hours in order to kill the spores with certainty and they may be

placed in a 5% solution of carbolic acid for a considerable time without being killed". Any process involving such measures would assuredly damage the hide so treated.

formed advise The establishment of a clearing house at the docks of our principal shipping centres through which all dry hides must pass, and until some process is discovered that will destroy the Bacillus and its spores I would strongly suggest that all these hides and skins be put through there the stages of manufacture that are dangerous to those handling them. The men here employed would be well versed in the dangers and be specially skilled in the manipulation of these products, besides being under the supervision of a person with more than a mere layman's knowledge on the subject.

The solution of the whole difficulty lies in the hands of the trade in this country, for by dealing solely in the wet salted hides the chances of Anthrax infection would be reduced to a minimum. I believe the tendency amongst the trade is to favour the use of wet salted hides and at several ports from where hides are imported all hides and skins are treated to a wet salting process before being shipped.

Photograph of Case 15

Showing extent of excision made.

The appearance of the base of raw surface is due to Pulv. Iodoform.

Photograph of Case 10

showing extent of incisions made

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